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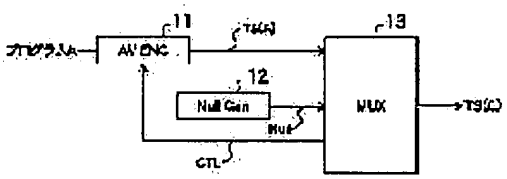
(54) DIGITAL ENCODING MULTIPLEXER

(57)Abstract:
PROBLEM TO BE SOLVED: To multiplex program data without adding any change to a data transmission rate about a bit stream on the side of being multiplexed by inserting a redundant code stream into an idle time that appears in a packet data stream from a compression encoding means and outputting it as a multiplexed bit stream.
SOLUTION: An acoustic video encoder 11 compresses a program A with compressibility that is indicated by a control signal CTL, makes it a packet and outputs it as a transport stream TS (A). When the stream TS (A) is inputted from the encoder 11, a multiplexer 13 outputs it in a transmission rate that is the same with the time of being inputted and when the stream TS (A) is not inputted, it inserts a null packet Null sent from a null packet generator 12 that is a redundant packet generating means into an idle period. Consequently, it is possible to generate a transport stream TS (C) which is easy to be remultiplexed.



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CLAIMS

[Claim]
[Claim 1] A compression coding means to carry out compression coding of the program data inputted, and to output as a packet data stream, A redundant code occurrence means to generate the redundant code which does not have a meaning in a sign, and to output as a redundant code stream, At the idle time which appears in the packet data stream inputted from the above-mentioned compression coding means Digital coding multiplexing equipment characterized by having a multiplexing means to output the multiplexing bit stream which inserts the redundant code inputted from the above-mentioned redundant code occurrence means, and has the same transmission rate as the above-mentioned packet data stream.
[Claim 2] It is the digital coding multiplexing equipment characterized by the above-mentioned multiplexing means setting up the compressibility of the above-mentioned program data in the above-mentioned compression coding means in digital coding multiplexing equipment given in a claim 1 based on the transmission rate of the above-mentioned multiplexing bit stream.
[Claim 3] A redundant code detection means for whether meaningless redundant code is contained to detect to a sign, and to output the detecting signal which shows the detection term of the concerned redundant code to it whenever redundant code is detected by it, when contained by the bit stream inputted, A compression coding means to carry out compression coding of the inputted program data, and to output as a packet data stream, The sending-out timing about the packet data stream inputted from the above-mentioned compression coding means A retardation means to adjust based on the detecting signal given from the above-mentioned redundant code detection means, and to avoid the contention with the significant packet data of the above-mentioned bit stream, and the significant packet data in the above-mentioned packet data stream, The significant packet data inputted from the above-mentioned retardation means are inserted in the above-mentioned redundant code term or idle time which appears in the above-mentioned bit stream. Digital coding multiplexing equipment characterized by having a multiplexing means to output the multiplexing bit stream which has the same transmission rate as the above-mentioned bit stream.
[Claim 4] Digital coding multiplexing equipment characterized by having further an update means of a clock regeneration information to update the clock regeneration information included in the packet data stream inputted into a claim 3 from the above-mentioned retardation means in the digital coding multiplexer of a publication at the above-mentioned multiplexing means according to the time delay within the above-mentioned retardation means of the significant packet data containing the concerned clock regeneration information.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed description]
[0001]
[The technical field to which invention belongs] this invention multiplexes 1 or two or more program data (picture data, sound data, etc.) to other bit streams (program data are included), and relates to the digital coding multiplexing equipment outputted as one bit stream.
[0002]
[Prior art] In the multiplexing formula represented by MPEG 2 (ISO/IEC13818), the convention for multiplexing two or more program data (for example, sound data and picture data) to one transport stream is defined (ITU-T recommendation H.222.0).
[0003] Drawing 2 is the conventional example of such digital coding multiplexing equipment, and drawing 3 is the example of operation. In addition, each of drawing 2 and drawing 3 expresses about the case where two program data are multiplexed to one transport stream.
[0004] The digital coding multiplexing equipment shown in drawing 2 consists of acoustic-imaging (AV) coding machines 1A and 1B which encode and output 2 program data A and B to a transport stream, respectively, and a multiplexing machine (MUX) 2 which carries out multiplex [of the transport stream TS (A) which is the output, and the TS (B)] to one transport stream TS (C), and outputs them to it.
[0005] The multiplexing machine 2 multiplexes each transport streams A and B inputted from the acoustic-imaging (AV) coding machines 1A and 1B by each stream twice the data transmission rate of transport, and it is constituted so that it may output as one transport stream TS (C).
[0006]
[Object of the Invention] However, in the digital coding multiplexing equipment of such a configuration, as shown in drawing 3 , the technical probrem that change of a bit rate became indispensable at the time of multiplexing occurred. And when such multiplexing processing (change of a data transmission rate) was performed, the technical probrem that the information which it has so that each program data may be a decode side and can reproduce an exact clock was spoiled by multiplexing occurred.
[0007] this invention was made in consideration of the above point, and it tends to propose the digital coding multiplexing equipment which can multiplex program data, without adding any change to a data transmission rate about the bit stream of the side multiplexed.
[0008]
[The means for solving a technical problem] In order to solve such a technical probrem, it sets to the 1st invention. (1) A compression coding means to carry out compression coding of the program data inputted, and to output as a packet data stream, (2) A redundant code occurrence means to generate the redundant code which does not have a meaning in a sign, and to output as a redundant code stream, (3) At the idle time which appears in the packet data stream inputted from a compression coding means The redundant code inputted from a redundant code occurrence means is inserted, and digital coding multiplexing equipment is equipped with a multiplexing means to output the multiplexing bit stream

which has the same transmission rate as a packet data stream.
[0009] Thus, since redundant code is multiplexed at the idle time in the packet data stream obtained by compression coding and the multiplexing bit stream was generated, in case the concerned program data are multiplexed with other bit streams, it can change into the multiplexing bit stream suitable for multiplexing, without adding change to a transmission rate.
[0010] Moreover, in order to solve such a technical probrem, it sets to the 2nd invention. (1) A redundant code detection means for whether meaningless redundant code is contained to detect to a sign, and to output the detecting signal which shows the detection term of the concerned redundant code to it whenever redundant code is detected by it, when contained by the bit stream inputted, (2) A compression coding means to carry out compression coding of the inputted program data, and to output as a packet data stream, (3) The sending-out timing about the packet data stream inputted from a compression coding means A retardation means to adjust based on the detecting signal given from a redundant code detection means, and to avoid the contention with the significant packet data of a bit stream, and the significant packet data in a packet data stream, (4) At the redundant code term or idle time which appears in a multiplexing bit stream The significant packet data inputted from a retardation means are inserted, and digital coding multiplexing equipment is equipped with a multiplexing means to output as a multiplexing bit stream which has the same transmission rate as a bit stream.
[0011] thus, contention of the significant packet data with other bit streams which serve as a multiplexing object by the retardation control which carried out compression coding of the program data, generated the idle time to the packet data stream, and used the concerned idle time -- avoiding -- being concerned -- others -- by inserting the significant packet data obtained from program data in the redundant code term or idle time which appears in a bit stream, a transmission rate is the same and it can multiplex
[0012]
[Gestalt of implementation of invention] Hereafter, the example of the enforcement gestalt of the digital coding multiplexing equipment concerning this invention is explained in order using a drawing.
[0013] (A) The functional-block configuration of the digital coding multiplexing equipment concerning the 1st enforcement gestalt is shown in the block diagram 1 of the enforcement gestalt equipment of the 1st enforcement gestalt (A-1) 1st.
[0014] This digital coding multiplexing equipment consists of an acoustic-imaging (AV) coding machine 11, a null packet generator 12, and a multiplexing machine (MUX) 13.
[0015] The acoustic-imaging (AV) coding machine 11 is a means to carry out compression coding of the program data A (sound data or picture data), to packet-ize it, and to output as a transport stream TS (A). In addition, compressibility here is controlled based on a control signal CTL, and it is determined that the data rate after compression (occurrence amount of information around unit time) becomes below a data transmission rate (the transport stream TS (A) and transmission rate of TS (C)).
[0016] The null packet generator 12 is a redundant packet generation means to generate the bit stream which does not include the acoustic-imaging (AV) information called null packet (Null).
[0017] The multiplexing machine (MUX) 13 multiplexes a null packet (Null) at the idle time of the transport stream TS (A), is a multiplexing means to output as a transport stream TS (C), makes the compressibility according to the data transmission rate a control signal CTL, and directs it in the acoustic-imaging (AV) coding vessel 11. In addition, it is constituted so that the data transmission rate outputted from the data transmission rate inputted into this multiplexing machine (MUX) 13 and the concerned multiplexing machine (MUX) 13 may be the same and an operation with the same clock may be possible at an input side and an output side.
[0018] (A-2) Explain the multiplexing operation by the 1st enforcement gestalt equipment, next a multiplexing operation of the digital coding multiplexing equipment which is the 1st enforcement gestalt equipment.
[0019] First, digital coding multiplexing equipment inputs inputted program data A into the acoustic-imaging (AV) coding machine 11. The acoustic-imaging (AV) coding machine 11 compresses and packet-izes the concerned program A with the compressibility which a control signal CTL directs, and

outputs it as a transport stream TS (A). The packet expressed as "A" to the drawing 4 upper case corresponds to this.
[0020] In addition, drawing 4 is an example at the time of setting the data rate (occurrence amount of information around unit time) of the transport stream TS (A) to one fourth of data transmission rates (the transport stream TS (A) and data transmission rate of TS (C)).
[0021] The multiplexing machine (MUX) 13 outputs this at the same data transmission rate as the time of an input, when the significant packet by which compression coding was carried out in this way is inputted from the acoustic-imaging (AV) coding machine 11. on the other hand, when the significant packet by which compression coding was carried out is not inputted, the null packet (Null) inputted from the null packet generator 12 (at the time of-less inputting namely, --) is inserted in the concerned empty term By this, as shown in the drawing 4 lower berth, the transport stream TS (C) in which the null packet (Null) which is a redundant bit appears to arbitrary timing will be outputted.
[0022] (A-3) the effect of the 1st enforcement gestalt equipment -- as mentioned above according to the 1st enforcement gestalt The data rate (occurrence amount of information around unit time) of program data A By having inserted the redundant packet within the idle time which compresses to become below the data transmission rate of the transport stream TS (C) outputted from the multiplexing machine 13, and was generated by the concerned compression processing Re-multiplexing can realize digital coding multiplexing equipment which can generate the easy transport stream TS (C).
[0023] Moreover, since it is between I/O of the multiplexing machine 13 and change of a data transmission rate is not needed in case of multiplexing, a loss of the technical probrem produced conventionally, i.e., the hour entry which improvement in the speed and clock regeneration of a data transmission rate take, etc. is effectively avoidable.
[0024] (B) The functional-block configuration of the digital coding multiplexing equipment concerning the 2nd enforcement gestalt is shown in the block diagram 5 of the enforcement gestalt equipment of the 2nd enforcement gestalt (B-1) 2nd. In addition, the same sign is attached and shown in the same fraction with drawing 1 at drawing 5 .
[0025] Digital coding multiplexing equipment consists of the acoustic-imaging (AV) coding machine 11, the null packet generator 12, a retardation machine 21, a null packet detector 22, and a multiplexing machine (MUX) 23. That is, the configuration of the acoustic-imaging (AV) coding machine 11 and the null packet generator 12 is the same as that of the 1st enforcement gestalt respectively. Therefore, below, other components are explained.
[0026] The retardation machine 21 is a retardation means which consists of a FIFO memory (FIFO memory) which has sufficient capacity to memorize 1 or two or more packets, and is a means to output a retardation output as transport stream TS (A)'. However, the time delay is not fixed in order to become settled according to the race condition produced between the bit streams (here transport stream TS (B)) of another side in the relation by which multiplex is carried out to the transport stream TS (A) inputted into the concerned retardation machine 21, and the internal store status of the concerned FIFO memory.
[0027] For example, when it is the case where the null packet detecting signal given from the null packet detector 22 is significant (for example, "H" level) and there is no waiting packet for sending out When there is a packet of the waiting for sending out to writing in the inputted packet, simultaneously reading (a time delay being zero at this time), the retardation machine 21 The retardation machine 21 operates so that the latency time may read the longest packet (according to the latency time to sending out, it carries out adjustable [of the time delay of the packet outputted at this time]).
[0028] On the other hand, when the null packet detecting signal given from the null packet detector 22 is not significant (for example, "L" level), the retardation machine 21 stores the inputted packet in the address which follows the tail end of the waiting packet for sending out noting that a race condition may arise.
[0029] For this reason, FIFO memory which can specify arbitrarily the both sides of the write-in address and the read-out address is used for the retardation machine 21.
[0030] The null packet detector 22 is a means to give the null packet detecting signal which detects whether the bit stream which does not include the acoustic-imaging (AV) information called null packet

(Null) to the transport stream TS (B) in transport stream TS (A)' and the relation by which multiplex is carried out is contained, and shows the detection result (timing) to the retardation machine 21.
[0031] The null packet detector 22 makes a null packet detecting signal a significant level ("H" level), when a null packet (Null) is detected, and when a null packet (Null) is not detected, it makes a null packet detecting signal non-mind level ("L" level).
[0032] By presence of this null packet detector 22 and the retardation machine 21, evasion of the situation where the significant packet of program data A and the significant packet of the transport stream TS (B) are inputted to this timing is achieved by the input of the multiplexing machine (MUX) 23.
[0033] The multiplexing machine (MUX) 23 is a means to input transport stream TS (A)', the bit stream of a null packet (Null), and the transport stream TS (B), to carry out multiplex [of these], and to output as one transport stream TS (C).
[0034] Although the stream of the direction where the significant packet is contained among transport stream TS (A)' and TS (B) is chosen and the significant packet is outputted as a transport stream TS (C), the multiplexing machine (MUX) 23 is constituted so that a null packet (Null) may be outputted in the concerned packet timing when not both streams contain a significant packet.
[0035] In addition, the point which the multiplexing machine (MUX) 23 makes the compressibility according to the data transmission rate a control signal CTL, and is directed in the acoustic-imaging (AV) coding vessel 11 is the same as that of the case of the multiplexing machine (MUX) 23 concerning the 1st enforcement gestalt.
[0036] (B-2) Explain the multiplexing operation by the 2nd enforcement gestalt equipment, next a multiplexing operation of the digital coding multiplexing equipment which is the 2nd enforcement gestalt equipment. Here, the example of operation is explained using drawing 6 . In addition, in drawing 6 , the transport stream TS (B) which is obtained with the 1st enforcement gestalt equipment with which a null packet (Null) is contained in arbitrary timing as a bit stream which is a multiplexing object shall be used.
[0037] Moreover, unlike the 1st enforcement gestalt equipment, this digital coding multiplexing equipment has two data inputs, inputs into one data input the stream (henceforth "the stream in self-equipment") obtained within self-equipment, and inputs into the data input of another side the bit stream (henceforth an equipment stream" besides ") processed in other equipments.
[0038] First, if significant data are inputted as program data A (sound data or picture data) which is a stream in self-equipment, with the compressibility directed with the control signal CTL, the acoustic-imaging (AV) coding machine 11 will be formed into an after [compression coding] packet, and will be outputted as a transport stream TS (A). This transport stream TS (A) is expressed with the significant packet "A" which appears dispersedly at drawing 6 .
[0039] On the other hand, if the null packet detector 22 inputs the transport stream TS (B) which is another equipments stream, the present input packet will judge whether it is a null packet (Null). "B" and the packet train of "Null" express this transport stream TS (B) by drawing 6 .
[0040] Now, in the case of this drawing 6 , since the head packet (shown in the drawing 6 left end) of another equipments stream is a significant packet "B", the null packet detecting signal of "L" level showing not being a null packet (Null) is outputted from the null packet detector 22 at the retardation machine 21. The retardation machine 21 which inputted this null packet detecting signal forbids read-out of the significant packet "A" of the stream in self-equipment inputted into the concerned retardation machine 21 to this timing, and it operates so that the content of data may be held.
[0041] Therefore, the significant packet inputted into the multiplexing machine (MUX) 23 about a head packet turns into the significant packet "B" inputted from another equipments stream, and the concerned packet "B" will be outputted as a transport stream TS in the concerned term (C).
[0042] To the following packet timing (the inside of drawing 6 , and the left to 2nd packet timing), since the input of program data A which is a stream in self-equipment is-less inputting by compression of data, the acoustic-imaging (AV) coding machine 11 does not output any packet to the concerned term. It is blank and this is expressed with drawing 6 .

[0043] On the other hand, about the transport stream TS (B) which is another equipments stream, since the null packet (Null) is inputted, the null packet detector 22 which detected presence of the concerned null packet (Null) outputs the null packet detecting signal of "H" level to the retardation machine 21.
[0044] Consequently, the retardation machine 21 cancels read-out prohibition of the significant packet "A" incorporated during the front packet, and outputs the concerned significant packet "A" to the multiplexing machine (MUX) 23 as a packet of transport stream TS (A)'.
[0045] That is, the significant packet "A" for which only 1 packet term was delayed will be outputted to the multiplexing machine (MUX) 23 as transport stream TS (A)'. The arrow head across transport stream TS (A)' expresses this correspondence relation by drawing 6 from the transport stream TS (A).
[0046] The significant packet inputted into the multiplexing machine (MUX) 23 about the concerned timing turns into the significant packet "A" inputted before 1 packet as a stream in self-equipment in this way, and the concerned packet "A" will be outputted as a transport stream TS in the concerned term (C). The significant packet "A" expressed to the drawing 6 lower berth corresponds to this.
[0047] Furthermore, to the following packet timing (the inside of drawing 6 , and the left to 3rd packet timing), while significant data are inputted as program data A which is a stream in self-equipment, a null packet (Null) is inputted about the transport stream TS (B) which is another equipments stream. Therefore, the retardation machine 21 reads the significant packet "A" inputted from the acoustic-imaging (AV) coding machine 11 without a time delay, and outputs it to the multiplexing machine (MUX) 23 as transport stream TS (A)'.
[0048] By this, from the multiplexing machine (MUX) 23, the significant packet "A" of a self-equipment stream will be outputted as a transport stream TS in the concerned term (C).
[0049] In addition, the input of program data A which is a stream in self-equipment was not inputted like the packet timing which continues further. and when the transport stream TS (B) which is another equipments stream is a null packet (Null) Since there is no input of the significant packet to the multiplexing machine (MUX) 23 also about which stream, the null packet (Null) inputted from the null packet generator 12 will be outputted as a transport stream TS (C).
[0050] By repeating the above operation, the packet train (--"B", "A", "A", "Null", "B", "A", and "A" --) which re-multiplexed the significant packet "A" of the stream in self-equipment will be outputted to the null packet (Null) input term of another equipments stream as a transport stream TS (C) from the multiplexing machine (MUX) 23.
[0051] In addition, when the transport stream TS (B) which is another equipments stream is program data by which compression coding was carried out like the transport stream TS (A), the null packet (Null) generated by the null packet generator 12 will be outputted to the transport stream TS (A) and the term (blank term when a significant packet does not exist) non-inputted [of both TS (B)] from the multiplexing machine (MUX) 23.
[0052] (B-3) the effect of the 2nd enforcement gestalt -- as mentioned above, according to the 2nd enforcement gestalt, since the multiplexing machine 23 can perform multiplexing processing by the input side and the output side using the same data transmission rate, as compared with the former, the easy digital coding multiplexing equipment of multiplexing processing is realizable
[0053] Moreover, since it can fluctuate freely by control of the compressibility, the number of packets generated with the acoustic-imaging (AV) coding vessel 11 can also perform freely a setup of the idle time which is needed in preparation for re-multiplexing.
[0054] And in the case of the multiplexing, except the information (existence of a null packet (Null)) about the bit stream (here transport stream TS (B)) of the side multiplexed, since it does not use, the control itself can be simplified.
[0055] (C) The functional-block configuration of the digital coding multiplexing equipment concerning the 3rd enforcement gestalt is shown in the block diagram 7 of the enforcement gestalt equipment of the 3rd enforcement gestalt (C-1) 3rd. In addition, correspondence and the same sign are attached and shown in correspondence with drawing 5 , and the same fraction at drawing 7 .
[0056] Digital coding multiplexing equipment consists of the acoustic-imaging (AV) coding machine 11, the null packet generator 12, retardation machine 21', and the null packet detector 22, the

multiplexing machine (MUX) 23 and PCR (Program Clock Reference:program time criteria reference value) change machine 31.
[0057] That is, the fraction of the others except retardation machine 21' and PCR change machine 31 becomes by the same equipment configuration as the 2nd enforcement gestalt equipment. Therefore, only retardation machine 21' and PCR change machine 31 are explained, and an explanation is omitted about other components here.
[0058] Retardation machine 21' is a means corresponding to the retardation machine 21 which constitutes the digital coding multiplexing equipment concerning the 2nd enforcement gestalt, and the basic configuration is the same as that of the retardation machine 21. That is, concerned retardation machine 21' consists of a retardation means which consists of a FIFO memory (FIFO memory) which has sufficient capacity to memorize 1 or two or more packets.
[0059] The point that this retardation machine 21' differs from the retardation machine 21 is a point that the function to give the time delay signal Td which gives a significant level (for example, "H" level) to PCR change machine 31 is added, only while performing retardation processing. This is for a gap of the hour entry produced by retardation processing to be made not to influence at the time of decode, as mentioned later.
[0060] PCR change machine 31 is a means for changing the hour entry for setting up or proofreading into the value to which a decoder side means the value of the basic synchronizing signal used as the time criteria by the side of decode called PCR (Program Clock Reference:program time criteria reference value) according to the amount of retardation.
[0061] For this reason, based on the time delay signal Td inputted from retardation machine 21' located in the preceding paragraph, PCR change machine 31 is constituted so that the correction can be performed. In addition, since it is a means aiming at such intended use, PCR change machine 31 is constituted by the packet (henceforth "non-PCR packet") which does not contain PCR so that it may be made to pass, without performing any processing. In addition, about the packet containing PCR, it is called "PCR packet" below.
[0062] The example of a configuration of PCR change machine 31 is shown in drawing 8 . As shown in drawing 8 , PCR change machine 31 consists of PCR judging circuit 32, the PCR register 33, a timer 34, an adder 35, and a selector 36. moreover -- PCR -- change -- a vessel -- 31 -- retardation -- a vessel -- 21 -- ' -- an output -- it is -- transport -- a stream -- TS -- (-- A --) -- ' -- inputting -- a sake -- an input -- an edge -- each -- a packet -- about -- a time delay -- a signal -- Td -- inputting -- a sake -- an input -- an edge -- having -- **** .
[0063] PCR judging circuit 32 is a means which an input packet judges in PCR packet or non-PCR packet. Here, when it judges with it being PCR packet, while a selection signal is outputted so that the input made to choose it as a selector 36 may be changed to an adder 35 side, PCR judging circuit 32 takes out PCR value in PCR packet, and stores it in the PCR register 33. On the other hand, when it judges with it being non-PCR packet, PCR judging circuit 32 outputs a selection signal so that the input made to choose it as a selector 36 may be changed to a retardation machine 21' side.
[0064] The PCR register 33 is a temporary storage means to hold PCR value taken out from PCR packet temporarily.
[0065] A timer 34 is a means to operate while the time delay signal Td is a significant level (for example, "H" level), and to count a time delay. In addition, the concerned counted value is reset, when the time delay signal Td changes to idle level (for example, "L" level) and the time delay signal Td which once changed to idle level changes to a significant level again.
[0066] An adder 35 is a means to add and output the counted value of a timer 34 to PCR value memorized by the PCR register 33.
[0067] A selector 36 is a means to output alternatively any of non-PCR packet inputted from retardation machine 21', or PCR packet after PCR value correction, or one side based on the selection signal given from PCR judging circuit 32.
[0068] (C-2) Explain the multiplexing operation by the 3rd enforcement gestalt equipment, next a multiplexing operation of the digital coding multiplexing equipment which is the 3rd enforcement

gestalt equipment. Here, the example of operation is explained using drawing 9 . In addition, also in this drawing 9 , that by which the null packet (Null) is contained in arbitrary timing is used for the transport stream TS (B).
[0069] The basic operation of this 3rd enforcement gestalt equipment is fundamentally [as the 2nd enforcement gestalt equipment which makes a basic configuration the same] the same so that drawing 9 may also show.
[0070] namely, when both the packets of the transport stream TS (B) which is the packet and other equipments stream of program A which are a stream in self-equipment inputted to this timing are significant packets As opposed to giving priority to the packet of the transport stream TS (B), and delaying the packet of program A When a null packet (Null) is inputted into the transport stream TS (B), it operates so that the significant packet of the stream in self-equipment inputted into the delayed packet or this timing of the stream in self-equipment may be made to output alternatively from the multiplexing machine 23.
[0071] Therefore, an operation in case PCR packet is inputted as a part for a right hand side peculiar to the 3rd enforcement gestalt and program data A which is a stream in self-equipment especially is explained here.
[0072] First, the case where there is no contention with PCR packet outputted from the acoustic-imaging (AV) coding machine 11 and the significant packet of the transport stream TS (B) which is another equipments stream is explained (namely, when a null packet (Null) is detected in the null packet detector 22).
[0073] In this case, PCR packet inputted into retardation machine 21' is given to PCR change machine 31 immediately without the latency time. The time delay signal Td inputted to PCR change machine 31 at this time is still idle level (for example, "L" level), without changing to a significant level (for example, "H" level) also at once. Therefore, the counted value outputted from a timer 34 is still zero, and the output value of an adder 35 is the same as that of the value when being inputted into the concerned PCR change machine 31.
[0074] Consequently, as transport stream TS(A)" which is the output of PCR change machine 31, PCR packet by which any change was not added to PCR value will be inputted into the multiplexing machine (MUX) 23, will be re-multiplexed, and will be outputted as a transport stream TS (C).
[0075] Next, the case where PCR packet outputted from the acoustic-imaging (AV) coding machine 11 and the significant packet of the transport stream TS (B) which is another equipments stream compete is explained (namely, when a null packet (Null) is not detected in the null packet detector 22). This operation is an operation of the packet timing expressed to the 3rd and the 2nd from the right among drawing 9 .
[0076] In this case, (the inside of drawing 9 , and the right to 3rd packet timing) an output is forbidden while PCR packet inputted into retardation machine 21' had been written in the predetermined address. On the other hand, about the significant packet "B" of the transport stream TS (B) inputted to this timing, it will be chosen with the multiplexing vessel (MUX) 23, and will be outputted as it is as a transport stream TS (C).
[0077] In addition, from retardation machine 21', the time delay signal Td of a significant level ("H" level) is outputted at this time.
[0078] However, to the following packet timing (the inside of drawing 9 , and the right to 2nd packet timing), since a null packet (Null) is inputted as a transport stream TS (B) which is another equipments stream, the null packet detecting signal of a significant level ("H" level) is outputted from the null packet detector 22 to retardation machine 21', and PCR packet stored in retardation machine 21' is read to PCR change machine 31. In addition, this time delay signal Td that reads, simultaneously is outputted from retardation machine 21' changes to idle level ("L" level).
[0079] Here, as it outputs PCR packet which has PCR value after change as an output of the present packet timing, PCR change machine 31 outputs a selection signal to a selector 36, while it will incorporate the PCR value to the PCR register 33, if it judges that the inputted packet is a PCR packet in PCR judging circuit 32.

[0080] Then, from the PCR register 33, while PCR value incorporated from PCR packet with the input is read and the concerned PCR packet is delayed by retardation machine 21', in an adder 35, it is added with the counted value of the timer 34 which was measuring the time delay. This corrects PCR value of PCR packet to the right value. And PCR packet which has PCR value after such correction is given to the multiplexing machine 23 from a selector 36, and is outputted as a transport stream TS (C).
[0081] (C-3) the effect of the 3rd enforcement gestalt -- as mentioned above, the easy digital coding multiplexing equipment of multiplexing processing which does not need change of a data transmission rate between I/O streams is realizable like the case of the 2nd enforcement gestalt also in the 3rd enforcement gestalt Moreover, since increase and decrease of the number of packets generated with the acoustic-imaging (AV) coding vessel 11 can also be performed free if compressibility is changed, in preparation for multiplexing for the second time, a setup of an idle time can also be performed freely.
[0082] And since PCR value is changed into the right value in the transport stream after re-multiplexing which is the output of such 3rd enforcement gestalt equipment, in case the concerned transport stream is decrypted, the regeneration of an exact clock carried out based on exact PCR value without the jitter by re-multiplexing is possible, and it is enabled to eliminate the bad influence by the side of the decoder by the time variation of a regeneration clock.
[0083] (D) In other enforcement gestalt, in addition the 1st enforcement gestalt Explain the equipment simple substance which generates the transport stream which was suitable for re-multiplexing from program data, and it sets in each the 2nd and 3rd enforcement gestalt. Although the equipment simple substance which multiplexes other program data was explained to the bit stream which consists of such a transport stream As shown in drawing 10 , cascade connection of the 1st enforcement gestalt equipment and the 2nd enforcement gestalt equipment is carried out, or cascade connection of the 1st enforcement gestalt equipment and the 3rd enforcement gestalt equipment is carried out, and it may be made to build a multiplexing system.
[0084] If it does in this way, much more program data can be multiplexed, without changing a data transmission rate, and the system which can be outputted as one transport stream TS (C) can also be built easily.
[0085] of course, not the thing restricted to the configuration of drawing 10 but the 1- it is good also as a configuration which combined each 3rd enforcement gestalt equipment arbitrarily
[0086] Moreover, in each the 2nd and 3rd enforcement gestalt, although the bit stream which multiplexes program data A which is a stream in self-equipment was explained as another equipments stream and reference was not made at all about the signal path, such a stream may be made to be transmitted from the equipment of a remote place connected through the network. Therefore, it is not necessarily restricted to what is built on the same point about the system shown in drawing 10 .
[0087] Moreover, although the case where PCR value was changed into the right value by adding the time delay measured by the timer 34 formed in PCR change machine 31 in the 3rd enforcement gestalt to the PCR register 33 was described The counter which measures the time delay about PCR packet detected by the judgment circuit and the concerned judgment circuit of PCR packet is prepared in retardation machine 21'. You may be made to give the counted value measured by the concerned counter to PCR change machine 31 (replacing with the time delay signal Td). Thus, even if it constitutes, PCR value can be changed into the right value like the 3rd enforcement gestalt.
[0088] moreover, the 1- in each 3rd enforcement gestalt, the compressibility at the time of being compression coding which the acoustic-imaging (AV) coding machine 11 performs will not be restricted to this, if the relation below the data transmission rate of the transport stream TS (C) to which the data rate after compression (occurrence amount of information around unit time) is outputted from the multiplexing machine 13 or 23 is filled, although explained as a configuration controlled from the multiplexing machine (MUX) 13 or 23 That is, you may be made to make this control from a control means to be made to carry out compression coding with the compressibility of the fixation defined beforehand, and to control a system wide.
[0089]
[Effect of the invention] As mentioned above, according to the 1st invention, the digital coding

multiplexing equipment which can output the multiplexing bit stream which can be multiplexed with other bit streams, without adding change to a transmission rate is easily realizable by multiplexing redundant code and generating a multiplexing bit stream at the idle time in the packet data stream generated by compression coding in a compression coding means.
[0090] By moreover, the retardation control which used the idle time in the packet data stream generated by compression coding in a compression coding means as mentioned above according to the 2nd invention contention of the significant packet data with other bit streams used as a multiplexing object -- avoiding -- being concerned -- others -- by inserting the significant packet data obtained from program data in the redundant code term or idle time which appears in a bit stream The digital coding multiplexing equipment which does not need change of a transmission rate but can perform multiplexing processing is easily realizable.

[Translation done.]

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention multiplexes 1 or two or more program data (picture data, sound data, etc.) to other bit streams (program data are included), and relates to the digital coding multiplexing equipment outputted as one bit stream.

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PRIOR ART

[Prior art] In the multiplexing formula represented by MPEG 2 (ISO/IEC13818), the convention for multiplexing two or more program data (for example, sound data and picture data) to one transport stream is defined (ITU-T recommendation H.222.0).
[0003] Drawing 2 is the conventional example of such digital coding multiplexing equipment, and drawing 3 is the example of operation. In addition, each of drawing 2 and drawing 3 expresses about the case where two program data are multiplexed to one transport stream.
[0004] The digital coding multiplexing equipment shown in drawing 2 consists of acoustic-imaging (AV) coding machines 1A and 1B which encode and output 2 program data A and B to a transport stream, respectively, and a multiplexing machine (MUX) 2 which carries out multiplex [of the transport stream TS (A) which is the output, and the TS (B)] to one transport stream TS (C), and outputs them to it.
[0005] The multiplexing machine 2 multiplexes each transport streams A and B inputted from the acoustic-imaging (AV) coding machines 1A and 1B by each stream twice the data transmission rate of transport, and it is constituted so that it may output as one transport stream TS (C).

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EFFECT OF THE INVENTION

[Effect of the invention] As mentioned above, according to the 1st invention, the digital coding multiplexing equipment which can output the multiplexing bit stream which can be multiplexed with other bit streams, without adding change to a transmission rate is easily realizable by multiplexing redundant code and generating a multiplexing bit stream at the idle time in the packet data stream generated by compression coding in a compression coding means.
[0090] By moreover, the retardation control which used the idle time in the packet data stream generated by compression coding in a compression coding means as mentioned above according to the 2nd invention contention of the significant packet data with other bit streams used as a multiplexing object -- avoiding -- being concerned -- others -- by inserting the significant packet data obtained from program data in the redundant code term or idle time which appears in a bit stream The digital coding multiplexing equipment which does not need change of a transmission rate but can perform multiplexing processing is easily realizable.

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TECHNICAL PROBLEM

[Object of the Invention] However, in the digital coding multiplexing equipment of such a configuration, as shown in drawing 3 , the technical probrem that change of a bit rate became indispensable at the time of multiplexing occurred. And when such multiplexing processing (change of a data transmission rate) was performed, the technical probrem that the information which it has so that each program data may be a decode side and can reproduce an exact clock was spoiled by multiplexing occurred.
[0007] this invention was made in consideration of the above point, and it tends to propose the digital coding multiplexing equipment which can multiplex program data, without adding any change to a data transmission rate about the bit stream of the side multiplexed.

[Translation done.]

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MEANS

[The means for solving a technical problem] In order to solve such a technical probrem, it sets to the 1st invention. (1) A compression coding means to carry out compression coding of the program data inputted, and to output as a packet data stream, (2) A redundant code occurrence means to generate the redundant code which does not have a meaning in a sign, and to output as a redundant code stream, (3) At the idle time which appears in the packet data stream inputted from a compression coding means The redundant code inputted from a redundant code occurrence means is inserted, and digital coding multiplexing equipment is equipped with a multiplexing means to output the multiplexing bit stream which has the same transmission rate as a packet data stream.
[0009] Thus, since redundant code is multiplexed at the idle time in the packet data stream obtained by compression coding and the multiplexing bit stream was generated, in case the concerned program data are multiplexed with other bit streams, it can change into the multiplexing bit stream suitable for multiplexing, without adding change to a transmission rate.
[0010] Moreover, in order to solve such a technical probrem, it sets to the 2nd invention. (1) A redundant code detection means for whether meaningless redundant code is contained to detect to a sign, and to output the detecting signal which shows the detection term of the concerned redundant code to it whenever redundant code is detected by it, when contained by the bit stream inputted, (2) A compression coding means to carry out compression coding of the inputted program data, and to output as a packet data stream, (3) The sending-out timing about the packet data stream inputted from a compression coding means A retardation means to adjust based on the detecting signal given from a redundant code detection means, and to avoid the contention with the significant packet data of a bit stream, and the significant packet data in a packet data stream, (4) At the redundant code term or idle time which appears in a multiplexing bit stream The significant packet data inputted from a retardation means are inserted, and digital coding multiplexing equipment is equipped with a multiplexing means to output as a multiplexing bit stream which has the same transmission rate as a bit stream.
[0011] thus, contention of the significant packet data with other bit streams which serve as a multiplexing object by the retardation control which carried out compression coding of the program data, generated the idle time to the packet data stream, and used the concerned idle time -- avoiding -- being concerned -- others -- by inserting the significant packet data obtained from program data in the redundant code term or idle time which appears in a bit stream, a transmission rate is the same and it can multiplex
[0012]
[Gestalt of implementation of invention] Hereafter, the example of the enforcement gestalt of the digital coding multiplexing equipment concerning this invention is explained in order using a drawing.
[0013] (A) The functional-block configuration of the digital coding multiplexing equipment concerning the 1st enforcement gestalt is shown in the block diagram 1 of the enforcement gestalt equipment of the 1st enforcement gestalt (A-1) 1st.
[0014] This digital coding multiplexing equipment consists of an acoustic-imaging (AV) coding machine 11, a null packet generator 12, and a multiplexing machine (MUX) 13.

[0015] The acoustic-imaging (AV) coding machine 11 is a means to carry out compression coding of the program data A (sound data or picture data), to packet-ize it, and to output as a transport stream TS (A). In addition, compressibility here is controlled based on a control signal CTL, and it is determined that the data rate after compression (occurrence amount of information around unit time) becomes below a data transmission rate (the transport stream TS (A) and transmission rate of TS (C)).
[0016] The null packet generator 12 is a redundant packet generation means to generate the bit stream which does not include the acoustic-imaging (AV) information called null packet (Null).
[0017] The multiplexing machine (MUX) 13 multiplexes a null packet (Null) at the idle time of the transport stream TS (A), is a multiplexing means to output as a transport stream TS (C), makes the compressibility according to the data transmission rate a control signal CTL, and directs it in the acoustic-imaging (AV) coding vessel 11. In addition, it is constituted so that the data transmission rate outputted from the data transmission rate inputted into this multiplexing machine (MUX) 13 and the concerned multiplexing machine (MUX) 13 may be the same and an operation with the same clock may be possible at an input side and an output side.
[0018] (A-2) Explain the multiplexing operation by the 1st enforcement gestalt equipment, next a multiplexing operation of the digital coding multiplexing equipment which is the 1st enforcement gestalt equipment.
[0019] First, digital coding multiplexing equipment inputs inputted program data A into the acoustic-imaging (AV) coding machine 11. The acoustic-imaging (AV) coding machine 11 compresses and packet-izes the concerned program A with the compressibility which a control signal CTL directs, and outputs it as a transport stream TS (A). The packet expressed as "A" to the drawing 4 upper case corresponds to this.
[0020] In addition, drawing 4 is an example at the time of setting the data rate (occurrence amount of information around unit time) of the transport stream TS (A) to one fourth of data transmission rates (the transport stream TS (A) and data transmission rate of TS (C)).
[0021] The multiplexing machine (MUX) 13 outputs this at the same data transmission rate as the time of an input, when the significant packet by which compression coding was carried out in this way is inputted from the acoustic-imaging (AV) coding machine 11. on the other hand, when the significant packet by which compression coding was carried out is not inputted, the null packet (Null) inputted from the null packet generator 12 (at the time of-less inputting namely, --) is inserted in the concerned empty term By this, as shown in the drawing 4 lower berth, the transport stream TS (C) in which the null packet (Null) which is a redundant bit appears to arbitrary timing will be outputted.
[0022] (A-3) the effect of the 1st enforcement gestalt equipment -- as mentioned above according to the 1st enforcement gestalt The data rate (occurrence amount of information around unit time) of program data A By having inserted the redundant packet within the idle time which compresses to become below the data transmission rate of the transport stream TS (C) outputted from the multiplexing machine 13, and was generated by the concerned compression processing Re-multiplexing can realize digital coding multiplexing equipment which can generate the easy transport stream TS (C).
[0023] Moreover, since it is between I/O of the multiplexing machine 13 and change of a data transmission rate is not needed in case of multiplexing, a loss of the technical probrem produced conventionally, i.e., the hour entry which improvement in the speed and clock regeneration of a data transmission rate take, etc. is effectively avoidable.
[0024] (B) The functional-block configuration of the digital coding multiplexing equipment concerning the 2nd enforcement gestalt is shown in the block diagram 5 of the enforcement gestalt equipment of the 2nd enforcement gestalt (B-1) 2nd. In addition, the same sign is attached and shown in the same fraction with drawing 1 at drawing 5 .
[0025] Digital coding multiplexing equipment consists of the acoustic-imaging (AV) coding machine 11, the null packet generator 12, a retardation machine 21, a null packet detector 22, and a multiplexing machine (MUX) 23. That is, the configuration of the acoustic-imaging (AV) coding machine 11 and the null packet generator 12 is the same as that of the 1st enforcement gestalt respectively. Therefore, below, other components are explained.

[0026] The retardation machine 21 is a retardation means which consists of a FIFO memory (FIFO memory) which has sufficient capacity to memorize 1 or two or more packets, and is a means to output a retardation output as transport stream TS (A)'. However, the time delay is not fixed in order to become settled according to the race condition produced between the bit streams (here transport stream TS (B)) of another side in the relation by which multiplex is carried out to the transport stream TS (A) inputted into the concerned retardation machine 21, and the internal store status of the concerned FIFO memory.
[0027] For example, when it is the case where the null packet detecting signal given from the null packet detector 22 is significant (for example, "H" level) and there is no waiting packet for sending out When there is a packet of the waiting for sending out to writing in the inputted packet, simultaneously reading (a time delay being zero at this time), the retardation machine 21 The retardation machine 21 operates so that the latency time may read the longest packet (according to the latency time to sending out, it carries out adjustable [of the time delay of the packet outputted at this time]).
[0028] On the other hand, when the null packet detecting signal given from the null packet detector 22 is not significant (for example, "L" level), the retardation machine 21 stores the inputted packet in the address which follows the tail end of the waiting packet for sending out noting that a race condition may arise.
[0029] For this reason, FIFO memory which can specify arbitrarily the both sides of the write-in address and the read-out address is used for the retardation machine 21.
[0030] The null packet detector 22 is a means to give the null packet detecting signal which detects whether the bit stream which does not include the acoustic-imaging (AV) information called null packet (Null) to the transport stream TS (B) in transport stream TS (A)' and the relation by which multiplex is carried out is contained, and shows the detection result (timing) to the retardation machine 21.
[0031] The null packet detector 22 makes a null packet detecting signal a significant level ("H" level), when a null packet (Null) is detected, and when a null packet (Null) is not detected, it makes a null packet detecting signal non-mind level ("L" level).
[0032] By presence of this null packet detector 22 and the retardation machine 21, evasion of the situation where the significant packet of program data A and the significant packet of the transport stream TS (B) are inputted to this timing is achieved by the input of the multiplexing machine (MUX) 23.
[0033] The multiplexing machine (MUX) 23 is a means to input transport stream TS (A)', the bit stream of a null packet (Null), and the transport stream TS (B), to carry out multiplex [of these], and to output as one transport stream TS (C).
[0034] Although the stream of the direction where the significant packet is contained among transport stream TS (A)' and TS (B) is chosen and the significant packet is outputted as a transport stream TS (C), the multiplexing machine (MUX) 23 is constituted so that a null packet (Null) may be outputted in the concerned packet timing when not both streams contain a significant packet.
[0035] In addition, the point which the multiplexing machine (MUX) 23 makes the compressibility according to the data transmission rate a control signal CTL, and is directed in the acoustic-imaging (AV) coding vessel 11 is the same as that of the case of the multiplexing machine (MUX) 23 concerning the 1st enforcement gestalt.
[0036] (B-2) Explain the multiplexing operation by the 2nd enforcement gestalt equipment, next a multiplexing operation of the digital coding multiplexing equipment which is the 2nd enforcement gestalt equipment. Here, the example of operation is explained using drawing 6 . In addition, in drawing 6 , the transport stream TS (B) which is obtained with the 1st enforcement gestalt equipment with which a null packet (Null) is contained in arbitrary timing as a bit stream which is a multiplexing object shall be used.
[0037] Moreover, unlike the 1st enforcement gestalt equipment, this digital coding multiplexing equipment has two data inputs, inputs into one data input the stream (henceforth "the stream in self-equipment") obtained within self-equipment, and inputs into the data input of another side the bit stream (henceforth an equipment stream" besides ") processed in other equipments.
[0038] First, if significant data are inputted as program data A (sound data or picture data) which is a

stream in self-equipment, with the compressibility directed with the control signal CTL, the acoustic-imaging (AV) coding machine 11 will be formed into an after [compression coding] packet, and will be outputted as a transport stream TS (A). This transport stream TS (A) is expressed with the significant packet "A" which appears dispersedly at drawing 6 .

[0039] On the other hand, if the null packet detector 22 inputs the transport stream TS (B) which is another equipments stream, the present input packet will judge whether it is a null packet (Null). "B" and the packet train of "Null" express this transport stream TS (B) by drawing 6 .

[0040] Now, in the case of this drawing 6 , since the head packet (shown in the drawing 6 left end) of another equipments stream is a significant packet "B", the null packet detecting signal of "L" level showing not being a null packet (Null) is outputted from the null packet detector 22 at the retardation machine 21. The retardation machine 21 which inputted this null packet detecting signal forbids read-out of the significant packet "A" of the stream in self-equipment inputted into the concerned retardation machine 21 to this timing, and it operates so that the content of data may be held.

[0041] Therefore, the significant packet inputted into the multiplexing machine (MUX) 23 about a head packet turns into the significant packet "B" inputted from another equipments stream, and the concerned packet "B" will be outputted as a transport stream TS in the concerned term (C).

[0042] To the following packet timing (the inside of drawing 6 , and the left to 2nd packet timing), since the input of program data A which is a stream in self-equipment is-less inputting by compression of data, the acoustic-imaging (AV) coding machine 11 does not output any packet to the concerned term. It is blank and this is expressed with drawing 6 .

[0043] On the other hand, about the transport stream TS (B) which is another equipments stream, since the null packet (Null) is inputted, the null packet detector 22 which detected presence of the concerned null packet (Null) outputs the null packet detecting signal of "H" level to the retardation machine 21.

[0044] Consequently, the retardation machine 21 cancels read-out prohibition of the significant packet "A" incorporated during the front packet, and outputs the concerned significant packet "A" to the multiplexing machine (MUX) 23 as a packet of transport stream TS (A)'.

[0045] That is, the significant packet "A" for which only 1 packet term was delayed will be outputted to the multiplexing machine (MUX) 23 as transport stream TS (A)'. The arrow head across transport stream TS (A)' expresses this correspondence relation by drawing 6 from the transport stream TS (A).

[0046] The significant packet inputted into the multiplexing machine (MUX) 23 about the concerned timing turns into the significant packet "A" inputted before 1 packet as a stream in self-equipment in this way, and the concerned packet "A" will be outputted as a transport stream TS in the concerned term (C). The significant packet "A" expressed to the drawing 6 lower berth corresponds to this.

[0047] Furthermore, to the following packet timing (the inside of drawing 6 , and the left to 3rd packet timing), while significant data are inputted as program data A which is a stream in self-equipment, a null packet (Null) is inputted about the transport stream TS (B) which is another equipments stream. Therefore, the retardation machine 21 reads the significant packet "A" inputted from the acoustic-imaging (AV) coding machine 11 without a time delay, and outputs it to the multiplexing machine (MUX) 23 as transport stream TS (A)'.

[0048] By this, from the multiplexing machine (MUX) 23, the significant packet "A" of a self-equipment stream will be outputted as a transport stream TS in the concerned term (C).

[0049] In addition, the input of program data A which is a stream in self-equipment was not inputted like the packet timing which continues further. and when the transport stream TS (B) which is another equipments stream is a null packet (Null) Since there is no input of the significant packet to the multiplexing machine (MUX) 23 also about which stream, the null packet (Null) inputted from the null packet generator 12 will be outputted as a transport stream TS (C).

[0050] By repeating the above operation, the packet train (--"B", "A", "A", "Null", "B", "A", and "A" --) which re-multiplexed the significant packet "A" of the stream in self-equipment will be outputted to the null packet (Null) input term of another equipments stream as a transport stream TS (C) from the multiplexing machine (MUX) 23.

[0051] In addition, when the transport stream TS (B) which is another equipments stream is program

data by which compression coding was carried out like the transport stream TS (A), the null packet (Null) generated by the null packet generator 12 will be outputted to the transport stream TS (A) and the term (blank term when a significant packet does not exist) non-inputted [of both TS (B)] from the multiplexing machine (MUX) 23.
[0052] (B-3) the effect of the 2nd enforcement gestalt -- as mentioned above, according to the 2nd enforcement gestalt, since the multiplexing machine 23 can perform multiplexing processing by the input side and the output side using the same data transmission rate, as compared with the former, the easy digital coding multiplexing equipment of multiplexing processing is realizable
[0053] Moreover, since it can fluctuate freely by control of the compressibility, the number of packets generated with the acoustic-imaging (AV) coding vessel 11 can also perform freely a setup of the idle time which is needed in preparation for re-multiplexing.
[0054] And in the case of the multiplexing, except the information (existence of a null packet (Null)) about the bit stream (here transport stream TS (B)) of the side multiplexed, since it does not use, the control itself can be simplified.
[0055] (C) The functional-block configuration of the digital coding multiplexing equipment concerning the 3rd enforcement gestalt is shown in the block diagram 7 of the enforcement gestalt equipment of the 3rd enforcement gestalt (C-1) 3rd. In addition, correspondence and the same sign are attached and shown in correspondence with drawing 5 , and the same fraction at drawing 7 .
[0056] Digital coding multiplexing equipment consists of the acoustic-imaging (AV) coding machine 11, the null packet generator 12, retardation machine 21', and the null packet detector 22, the multiplexing machine (MUX) 23 and PCR (Program Clock Reference:program time criteria reference value) change machine 31.
[0057] That is, the fraction of the others except retardation machine 21' and PCR change machine 31 becomes by the same equipment configuration as the 2nd enforcement gestalt equipment. Therefore, only retardation machine 21' and PCR change machine 31 are explained, and an explanation is omitted about other components here.
[0058] Retardation machine 21' is a means corresponding to the retardation machine 21 which constitutes the digital coding multiplexing equipment concerning the 2nd enforcement gestalt, and the basic configuration is the same as that of the retardation machine 21. That is, concerned retardation machine 21' consists of a retardation means which consists of a FIFO memory (FIFO memory) which has sufficient capacity to memorize 1 or two or more packets.
[0059] The point that this retardation machine 21' differs from the retardation machine 21 is a point that the function to give the time delay signal Td which gives a significant level (for example, "H" level) to PCR change machine 31 is added, only while performing retardation processing. This is for a gap of the hour entry produced by retardation processing to be made not to influence at the time of decode, as mentioned later.
[0060] PCR change machine 31 is a means for changing the hour entry for setting up or proofreading into the value to which a decoder side means the value of the basic synchronizing signal used as the time criteria by the side of decode called PCR (Program Clock Reference:program time criteria reference value) according to the amount of retardation.
[0061] For this reason, based on the time delay signal Td inputted from retardation machine 21' located in the preceding paragraph, PCR change machine 31 is constituted so that the correction can be performed. In addition, since it is a means aiming at such intended use, PCR change machine 31 is constituted by the packet (henceforth "non-PCR packet") which does not contain PCR so that it may be made to pass, without performing any processing. In addition, about the packet containing PCR, it is called "PCR packet" below.
[0062] The example of a configuration of PCR change machine 31 is shown in drawing 8 . As shown in drawing 8 , PCR change machine 31 consists of PCR judging circuit 32, the PCR register 33, a timer 34, an adder 35, and a selector 36. moreover -- PCR -- change -- a vessel -- 31 -- retardation -- a vessel -- 21 -- ' -- an output -- it is -- transport -- a stream -- TS -- (-- A --) -- ' -- inputting -- a sake -- an input -- an edge -- each -- a packet -- about -- a time delay -- a signal -- Td -- inputting -- a sake -- an input -- an

edge -- having -- **** .
[0063] PCR judging circuit 32 is a means which an input packet judges in PCR packet or non-PCR packet. Here, when it judges with it being PCR packet, while a selection signal is outputted so that the input made to choose it as a selector 36 may be changed to an adder 35 side, PCR judging circuit 32 takes out PCR value in PCR packet, and stores it in the PCR register 33. On the other hand, when it judges with it being non-PCR packet, PCR judging circuit 32 outputs a selection signal so that the input made to choose it as a selector 36 may be changed to a retardation machine 21' side.
[0064] The PCR register 33 is a temporary storage means to hold PCR value taken out from PCR packet temporarily.
[0065] A timer 34 is a means to operate while the time delay signal Td is a significant level (for example, "H" level), and to count a time delay. In addition, the concerned counted value is reset, when the time delay signal Td changes to idle level (for example, "L" level) and the time delay signal Td which once changed to idle level changes to a significant level again.
[0066] An adder 35 is a means to add and output the counted value of a timer 34 to PCR value memorized by the PCR register 33.
[0067] A selector 36 is a means to output alternatively any of non-PCR packet inputted from retardation machine 21', or PCR packet after PCR value correction, or one side based on the selection signal given from PCR judging circuit 32.
[0068] (C-2) Explain the multiplexing operation by the 3rd enforcement gestalt equipment, next a multiplexing operation of the digital coding multiplexing equipment which is the 3rd enforcement gestalt equipment. Here, the example of operation is explained using drawing 9 . In addition, also in this drawing 9 , that by which the null packet (Null) is contained in arbitrary timing is used for the transport stream TS (B).
[0069] The basic operation of this 3rd enforcement gestalt equipment is fundamentally [as the 2nd enforcement gestalt equipment which makes a basic configuration the same] the same so that drawing 9 may also show.
[0070] namely, when both the packets of the transport stream TS (B) which is the packet and other equipments stream of program A which are a stream in self-equipment inputted to this timing are significant packets As opposed to giving priority to the packet of the transport stream TS (B), and delaying the packet of program A When a null packet (Null) is inputted into the transport stream TS (B), it operates so that the significant packet of the stream in self-equipment inputted into the delayed packet or this timing of the stream in self-equipment may be made to output alternatively from the multiplexing machine 23.
[0071] Therefore, an operation in case PCR packet is inputted as a part for a right hand side peculiar to the 3rd enforcement gestalt and program data A which is a stream in self-equipment especially is explained here.
[0072] First, the case where there is no contention with PCR packet outputted from the acoustic-imaging (AV) coding machine 11 and the significant packet of the transport stream TS (B) which is another equipments stream is explained (namely, when a null packet (Null) is detected in the null packet detector 22).
[0073] In this case, PCR packet inputted into retardation machine 21' is given to PCR change machine 31 immediately without the latency time. The time delay signal Td inputted to PCR change machine 31 at this time is still idle level (for example, "L" level), without changing to a significant level (for example, "H" level) also at once. Therefore, the counted value outputted from a timer 34 is still zero, and the output value of an adder 35 is the same as that of the value when being inputted into the concerned PCR change machine 31.
[0074] Consequently, as transport stream TS(A)" which is the output of PCR change machine 31, PCR packet by which any change was not added to PCR value will be inputted into the multiplexing machine (MUX) 23, will be re-multiplexed, and will be outputted as a transport stream TS (C).
[0075] Next, the case where PCR packet outputted from the acoustic-imaging (AV) coding machine 11 and the significant packet of the transport stream TS (B) which is another equipments stream compete is

explained (namely, when a null packet (Null) is not detected in the null packet detector 22). This operation is an operation of the packet timing expressed to the 3rd and the 2nd from the right among drawing 9 .

[0076] In this case, (the inside of drawing 9 , and the right to 3rd packet timing) an output is forbidden while PCR packet inputted into retardation machine 21' had been written in the predetermined address. On the other hand, about the significant packet "B" of the transport stream TS (B) inputted to this timing, it will be chosen with the multiplexing vessel (MUX) 23, and will be outputted as it is as a transport stream TS (C).

[0077] In addition, from retardation machine 21', the time delay signal Td of a significant level ("H" level) is outputted at this time.

[0078] However, to the following packet timing (the inside of drawing 9 , and the right to 2nd packet timing), since a null packet (Null) is inputted as a transport stream TS (B) which is another equipments stream, the null packet detecting signal of a significant level ("H" level) is outputted from the null packet detector 22 to retardation machine 21', and PCR packet stored in retardation machine 21' is read to PCR change machine 31. In addition, this time delay signal Td that reads, simultaneously is outputted from retardation machine 21' changes to idle level ("L" level).

[0079] Here, as it outputs PCR packet which has PCR value after change as an output of the present packet timing, PCR change machine 31 outputs a selection signal to a selector 36, while it will incorporate the PCR value to the PCR register 33, if it judges that the inputted packet is a PCR packet in PCR judging circuit 32.

[0080] Then, from the PCR register 33, while PCR value incorporated from PCR packet with the input is read and the concerned PCR packet is delayed by retardation machine 21', in an adder 35, it is added with the counted value of the timer 34 which was measuring the time delay. This corrects PCR value of PCR packet to the right value. And PCR packet which has PCR value after such correction is given to the multiplexing machine 23 from a selector 36, and is outputted as a transport stream TS (C).

[0081] (C-3) the effect of the 3rd enforcement gestalt -- as mentioned above, the easy digital coding multiplexing equipment of multiplexing processing which does not need change of a data transmission rate between I/O streams is realizable like the case of the 2nd enforcement gestalt also in the 3rd enforcement gestalt Moreover, since increase and decrease of the number of packets generated with the acoustic-imaging (AV) coding vessel 11 can also be performed free if compressibility is changed, in preparation for multiplexing for the second time, a setup of an idle time can also be performed freely.

[0082] And since PCR value is changed into the right value in the transport stream after re-multiplexing which is the output of such 3rd enforcement gestalt equipment, in case the concerned transport stream is decrypted, the regeneration of an exact clock carried out based on exact PCR value without the jitter by re-multiplexing is possible, and it is enabled to eliminate the bad influence by the side of the decoder by the time variation of a regeneration clock.

[0083] (D) In other enforcement gestalt, in addition the 1st enforcement gestalt Explain the equipment simple substance which generates the transport stream which was suitable for re-multiplexing from program data, and it sets in each the 2nd and 3rd enforcement gestalt. Although the equipment simple substance which multiplexes other program data was explained to the bit stream which consists of such a transport stream As shown in drawing 10 , cascade connection of the 1st enforcement gestalt equipment and the 2nd enforcement gestalt equipment is carried out, or cascade connection of the 1st enforcement gestalt equipment and the 3rd enforcement gestalt equipment is carried out, and it may be made to build a multiplexing system.

[0084] If it does in this way, much more program data can be multiplexed, without changing a data transmission rate, and the system which can be outputted as one transport stream TS (C) can also be built easily.

[0085] of course, not the thing restricted to the configuration of drawing 10 but the 1- it is good also as a configuration which combined each 3rd enforcement gestalt equipment arbitrarily

[0086] Moreover, in each the 2nd and 3rd enforcement gestalt, although the bit stream which multiplexes program data A which is a stream in self-equipment was explained as another equipments

stream and reference was not made at all about the signal path, such a stream may be made to be transmitted from the equipment of a remote place connected through the network. Therefore, it is not necessarily restricted to what is built on the same point about the system shown in drawing 10 .
[0087] Moreover, although the case where PCR value was changed into the right value by adding the time delay measured by the timer 34 formed in PCR change machine 31 in the 3rd enforcement gestalt to the PCR register 33 was described The counter which measures the time delay about PCR packet detected by the judgment circuit and the concerned judgment circuit of PCR packet is prepared in retardation machine 21'. You may be made to give the counted value measured by the concerned counter to PCR change machine 31 (replacing with the time delay signal Td). Thus, even if it constitutes, PCR value can be changed into the right value like the 3rd enforcement gestalt.
[0088] moreover, the 1- in each 3rd enforcement gestalt, the compressibility at the time of being compression coding which the acoustic-imaging (AV) coding machine 11 performs will not be restricted to this, if the relation below the data transmission rate of the transport stream TS (C) to which the data rate after compression (occurrence amount of information around unit time) is outputted from the multiplexing machine 13 or 23 is filled, although explained as a configuration controlled from the multiplexing machine (MUX) 13 or 23 That is, you may be made to make this control from a control means to be made to carry out compression coding with the compressibility of the fixation defined beforehand, and to control a system wide.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[An easy explanation of a drawing]
[Drawing 1] It is the block diagram showing the configuration of the digital coding multiplexing equipment which is the 1st enforcement gestalt equipment.
[Drawing 2] It is the block diagram showing the configuration of equipment conventionally.
[Drawing 3] It is drawing showing the example of a multiplexing operation of equipment conventionally.
[Drawing 4] It is drawing showing the example of a multiplexing operation by the 1st enforcement gestalt equipment.
[Drawing 5] It is the block diagram showing the configuration of the digital coding multiplexing equipment which is the 2nd enforcement gestalt equipment.
[Drawing 6] It is drawing showing the example of a multiplexing operation by the 2nd enforcement gestalt equipment.
[Drawing 7] It is the block diagram showing the configuration of the digital coding multiplexing equipment which is the 3rd enforcement gestalt equipment.
[Drawing 8] It is the block diagram showing the detailed configuration of PCR change machine.
[Drawing 9] It is drawing showing the example of a multiplexing operation by the 3rd enforcement gestalt equipment.
[Drawing 10] the 1- it is drawing showing the example of a system built by each 3rd enforcement gestalt equipment
[An explanation of a sign]
11 [-- A multiplexing machine (MUX), 21, 21' / -- A retardation machine, 22 / -- A null packet detector, 31 / -- PCR change machine, 32 / -- PCR judging circuit, 33 / -- PCR register, 34 / -- A timer, 35 / -- An adder, 36 / -- Selector.] -- An acoustic-imaging (AV) coding machine, 12 -- A null packet generator, 13, 23

[Translation done.]

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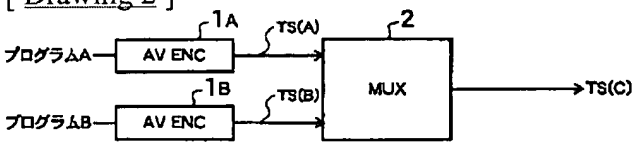
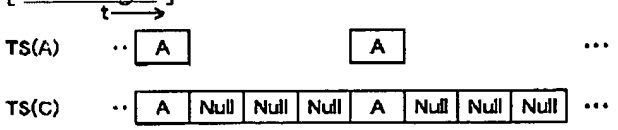
DRAWINGS

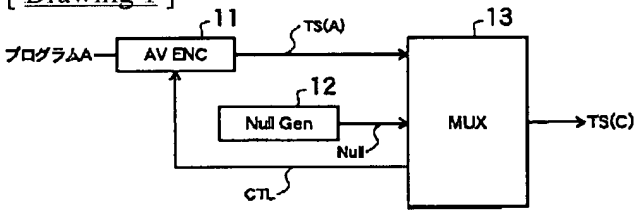
[Drawing 2]



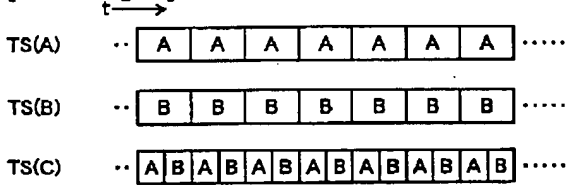
[Drawing 4]



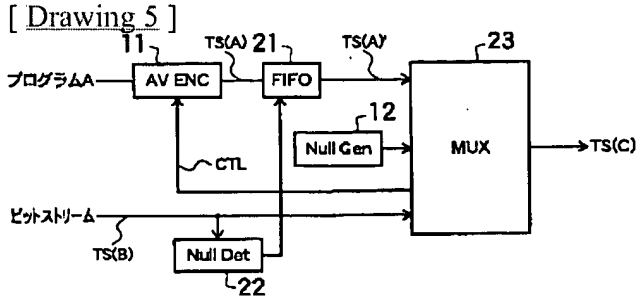
[Drawing 1]



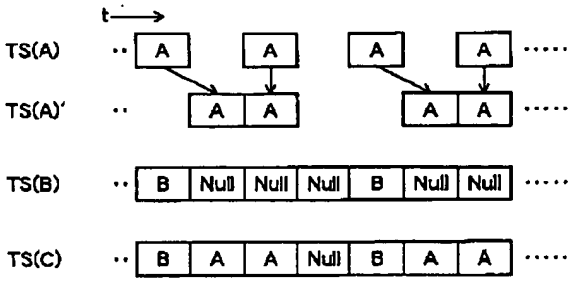
[Drawing 3]



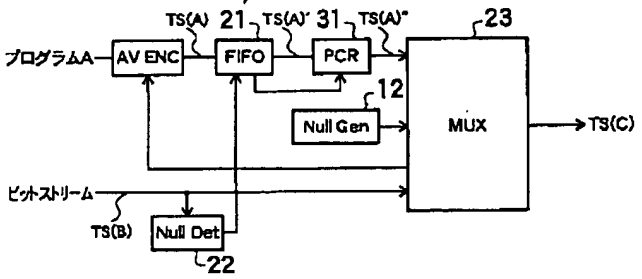
[Drawing 5]



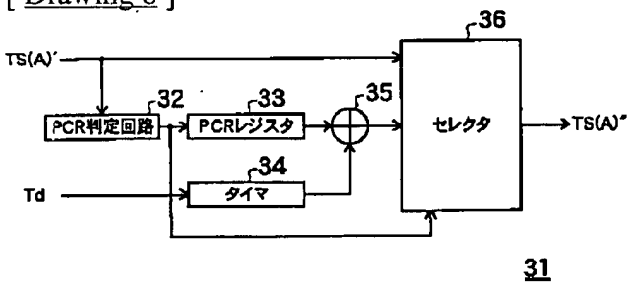
[Drawing 6]



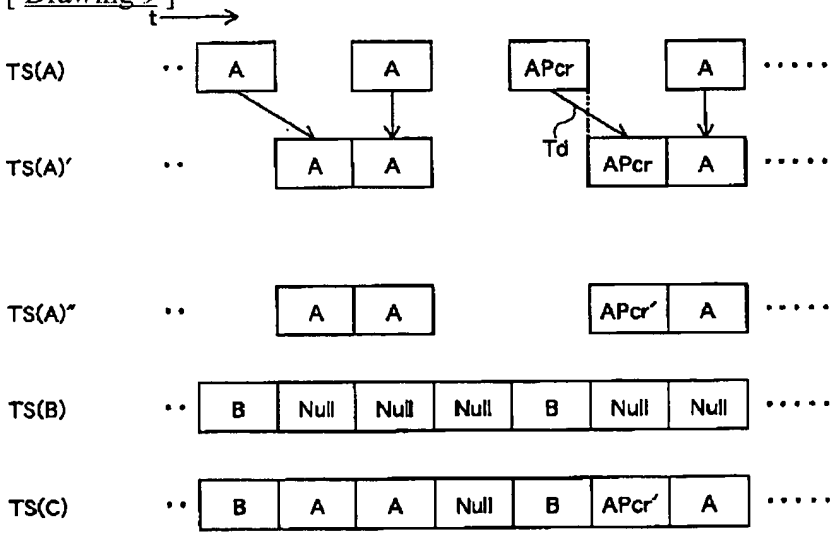
[Drawing 7]



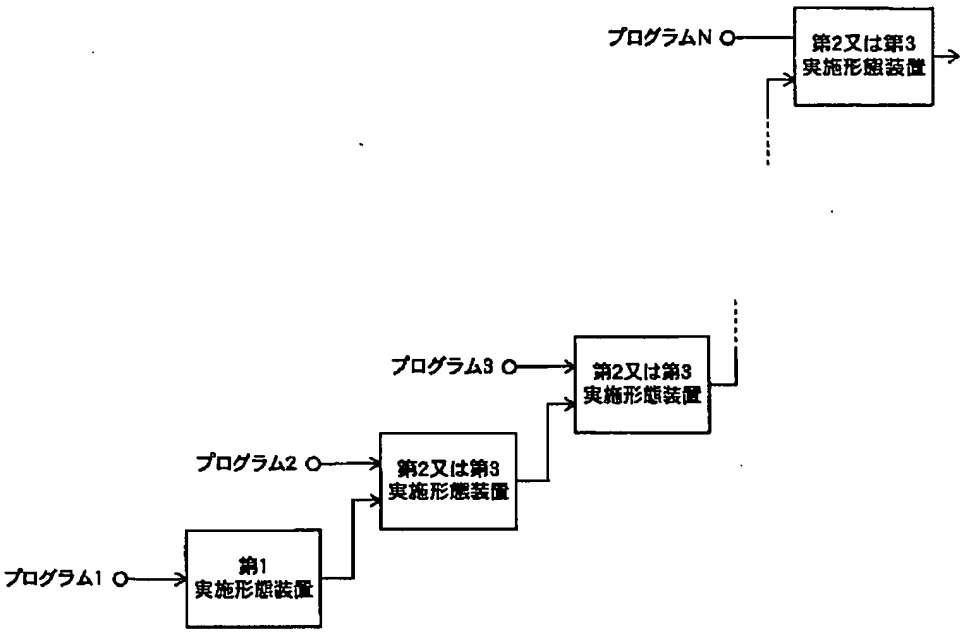
[Drawing 8]



[Drawing 9]



[Drawing 10]



[Translation done.]